

EXAMINATION

7 June 2022 (am)

Subject F101 — *Health and Care* Fellowship Principles

Time allowed: Three hours and fifteen minutes, plus an additional five minutes to allow for scrolling in the ASSA Exam Platform

Total marks: 100

INSTRUCTIONS TO THE CANDIDATE

1. Ensure that you are logged in and authenticated through Examy before you attempt the examination.
2. The question paper is only available in the ASSA Exam Platform as a PDF download and may not be printed. Copy/paste of questions or parts thereof is allowed from the question paper to your Word answer document only.
3. You are required to submit your answers in Word format ONLY using the answer template provided. No answers in any other format (e.g. handwritten) will be accepted.
4. Ensure that your Candidate Number appears in the “header” of your Word answer document. [Double-click on the header at the top of the Word document, input your candidate number only in the header, then press “Esc” to close the header.] **Do not use your name or member number anywhere in your Word answer document.**
5. You may not access any file from your computer, use any other computer program (e.g. Email or Excel), or open any other browser during the examination.
6. You may not use any other material (e.g. a Formulae and Tables book) during the examination. Any such information that may be required will be provided to you within the examination.
7. You are strongly encouraged to use the first 15 minutes as reading time only, however, you may start answering the paper whenever you are ready.
8. Mark allocations are shown in brackets.
9. Attempt all eight (8) questions.
10. Show calculations where appropriate. You may use blank paper to carry out rough work calculations. You may use a calculator from the approved list only.
11. Upload your Word answer document only into the ASSA Exam Platform. Once you have uploaded your document, you must click on **Finish Attempt** to save your document. You will still be allowed to go back and make changes (**Review Attempt**) if you have time.
12. Once you are satisfied with your uploaded document, click **Finish attempt** and **Finish all and Submit**. Once you have submitted you will not be able to make any changes.
13. **You must submit your Word answer document BEFORE the end of the allotted examination time.** Take this into account when planning your review and submission. There will be no time announcements.

Note: The Actuarial Society of South Africa will not be held responsible for loss of data where candidates have not followed instructions as set out above.

END OF INSTRUCTIONS

QUESTION 1

You are a pricing actuary building a GLM model for an existing PMI book of business. You have individual policyholder-level data, including age, sex, number of chronic conditions, and average monthly claims costs – including those with zero claims.

- i. Describe how you could use this data to build a GLM to estimate costs as well as the factors you should consider in the GLM specifications. [4]
- ii. Outline the benefits and pitfalls of using a GLM versus a one-way analysis. [3]

[Total 7]

QUESTION 2

An insurer offers regular premium critical illness and long-term care cover products. Both products offer lump sum benefits that are escalated at CPI+2% per annum.

- i. Outline 6 policyholder needs that such a critical illness product can meet. [3]
- ii. Discuss the key risks to which the policyholders on these products are exposed to. [6]

[Total 9]

QUESTION 3

You are a pricing actuary working at the life insurer, CIRUS Life, which currently sells various life benefits in the market. Among them are two versions of Critical Illness (CI) benefit, namely:

- ‘Comprehensive CI’, a stand-alone CI benefit covering over 100 different serious conditions/illnesses
- ‘Light CI’, a rider CI benefit to their Death Benefit, covering 20 different serious conditions/illnesses

- i. Define both a stand-alone CI benefit and a rider CI benefit. [2]

You’ve noticed that the incidence rate of the rider CI benefit is significantly lower than the stand-alone CI benefit when looking over CIRUS Life’s claims experience for the past 5 years.

- ii. Discuss possible reasons for the significantly lower claims incidence. [4]

The lower incidence has resulted in the claims experience being lower than priced for in the ‘Light CI’ benefit. The Marketing Actuary at CIRUS Life is worried about the reputational impact this lower than expected claims experience could have on the company.

- iii. List ways in which the insurer can increase the claims experience of the ‘Light CI’ benefit to bring this more in line with the pricing assumptions. [3]

[Total 9]

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QUESTION 4

- i. List the main aims of financial services regulation.

[2]

In a particular territory, health insurance is currently priced on the principle of mutuality.

- ii. Outline the difference between the principles of mutuality and solidarity.

[1]

The health insurance regulator in this country is considering introducing new regulation mandating community rating of health insurance premiums for all PMI policies sold and administered in this territory.

- iii. Describe the direct and indirect costs of introducing such regulation in this territory.

[5]

- iv. Describe the potential benefits to the various stakeholders of introducing such regulation in this territory.

[2]

[Total 10]

QUESTION 5

A large health insurer writes critical illness cover. You are a consulting actuary and have been asked to make recommendations to the insurer with respect to obtaining reinsurance cover.

- i. Describe reasons why the insurer may choose to reinsure their business.

[5]

- ii. List the information you would request from the insurer to complete this work.

[4]

- iii. Discuss when proportional or non-proportional reinsurance may be more appropriate.

[4]

[Total 13]

QUESTION 6

You have been appointed as the pricing actuary for a large health insurer that has operations in various countries. You have been asked to price a new private medical insurance (PMI) product. This product will be sold in the countries in which the insurer operates and the design and key features will be uniform between countries. You have access to all the data from the insurer's operations in each of these countries.

- i. Describe the steps in the process you would follow to price these products.

[10]

A large employer with operations in several of those countries has approached this insurer and is looking for a PMI solution for its employees.

- ii. Describe the additional considerations and requirements for pricing such a group PMI product.

[6]

[Total 16]

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QUESTION 7

In the Combined States of Actuarial (CSA), the Federal Department of Health (FDH) is investigating the healthcare experience in the respective States. In the State of Martingale, healthcare costs are lower than in the CSA overall. The FDH is concerned that the State is underservicing its residents when it comes to healthcare provision.

The State of Martingale claims that they have a significantly healthier population than the CSA average due to their active lifestyles. The State of Martingale goes further to say that they are also managing costs better than compared to the National average and thus have a lower overall average cost.

You have been appointed as an independent actuarial assessor by the FDH to investigate the healthcare costs in the State of Martingale. Your first task is to understand whether the disease burden in Martingale is different to that of the national average. The Department has provided you with the following summarized data on a Per Life Per Month (PLPM) basis:

Gender	Chronic Status	Age Category	National Population Distribution	Population Distribution in Martingale	National Average Cost PLPM
Male	Non-Chronic	Children	10.7%	11.1%	2 035
Male	Non-Chronic	Adults	23.8%	22.4%	3 031
Male	Chronic	Adults	15.6%	15.0%	4 625
Female	Non-Chronic	Children	11.0%	11.0%	2 037
Female	Non-Chronic	Adults	24.9%	28.6%	2 803
Female	Chronic	Adults	14.0%	11.9%	4 615

- i. Calculate the population-weighted PLPM cost in Martingale compared to the CSA national average.
[2]
- ii. Comment briefly on Martingale's claim that they have a healthier population considering the population-weighted PLPM cost calculated in i.
[2]

The department has also provided you with the claims experience PLPM of Martingale:

Gender	Chronic Status	Age Category	Population Distribution in Martingale	Martingale Average PLPM
Male	Non-Chronic	Children	11.1%	2 113
Male	Non-Chronic	Adults	22.4%	3 105
Male	Chronic	Adults	15.0%	4 005
Female	Non-Chronic	Children	11.0%	2 308
Female	Non-Chronic	Adults	28.6%	2 878
Female	Chronic	Adults	11.9%	3 638

- iii. Calculate whether Martingale is, in fact, more efficient in managing costs relative to the CSA as a whole.
[3]

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On discussing the results of your investigation with a colleague, she mentions that it might be a good idea to understand whether the quality of care in Martingale is being compromised or not. Assume you have full access to the State of Martingale's healthcare and demographic data.

- iv. Outline the items which you could evaluate to measure the quality of care provided in Martingale.

[5]

Your analyses show that there is indeed a compromise in quality to attain cost savings.

- v. Discuss whether such a compromise is sustainable in achieving cost savings.

[3]

[Total 15]

QUESTION 8

The government of Actuasia has been concerned about the increasing burden of Cancer on the population. Cancer treatment is currently accessed at state-owned or private facilities, depending on whether the patient has private health insurance or not.

The government of Actuasia has decided to set up state-owned cancer treatment centres. The treatment centres will provide free cancer treatment to all citizens of Actuasia.

- i. Outline briefly the implications of the proposed state-owned cancer treatment centres for each of the following stakeholders:

- a. the State

[2]

- b. the existing state hospitals

[1]

- c. the population of Actuasia

[3]

- ii. Outline potential role(s) for the private health sector with this government initiative.

[3]

The Health Minister of Actuasia has approached you, an independent consulting actuary. She has explained that the cancer treatment provided by these state-owned treatment centres will be funded firstly via donor funding specifically earmarked for the treatment centres, and secondly, the balance will be funded from State budget allocation. She has expressed concern over the high cost of cancer treatments.

- iii. Describe how you would estimate the State budget allocation required for the cancer treatment costs in these treatment centres over the medium term.

[8]

- iv. Suggest measures the State can consider for managing the cancer treatment costs.

[4]

[Total 21]

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END OF PAPER